PDB11

DIFFERENCES IN HYPOGLYCEMIA EVENT RATES AND ASSOCIATED COST-CONSEQUENCE IN PATIENTS INITIATED ON LONG-ACTING AND INTERMEDIATE-ACTING INSULIN PRODUCTS

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OBJECTIVES: To compare hypoglycemia event rates and the associated cost-consequence in patients initiated on long-acting analogue insulin (glargine) or intermediate-acting insulins (NPH). **METHODS:** This was a longitudinal administrative claims database analysis from a managed care perspective using a retrospective cohort design. Data were obtained from a large southeastern US managed care plan with approximately 2.5 million quality data lives. All patients newly initiated on glargine or NPH between July 1, 2000 and August 31, 2002 were identified (no use of glargine/NPH in the 4 months prior to index date). Hypoglycemia event rates were identified by the presence of medical claims with ICD-9-CM codes. Analyses were performed using multivariable regression techniques. **RESULTS:** The sample size was 1434 patients (glargine = 310, NPH = 1124). Mean age was 53 ± 17 years; 51.5% were male. Mean treatment duration was 9 ± 4 months. After controlling for A1C and other cogent demographic and clinical variables, patients in the NPH cohort had a higher hypoglycemia event rate than the glargine group (18.3 versus 7.3 per 100 patients/year; $p = 0.009$). This event rate yielded a number-needed-to-treat of nine patients (glargine versus NPH) to avoid one hypoglycemia event per member per year (PMPY). Mean cost per hypoglycemia event was $1087 (95% CI: $764–$1409). Mean annual index medication costs for the glargine cohort were $47 more PMPY compared to the NPH cohort ($390 versus $343; $p = 0.042$). **CONCLUSIONS:** Patients treated with glargine had a lower hypoglycemia event rate compared to NPH. The increased cost associated with treating nine patients with glargine for one year (i.e., 9 × $47 = $423) is less than the cost to treat one hypoglycemic event ($1087).

PDB12

ESTIMATING THE REDUCTION IN LONG TERM COMPLICATION AND COSTS OF COMPLICATIONS IN TYPE 1 DIABETES BY REDUCED A1C LEVELS DUE TO MORE FREQUENT BLOOD GLUCOSE MONITORING

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OBJECTIVES: To simulate the impact of increased daily blood glucose monitoring on risk of late complications for Type-1diabetes patients. **METHODS:** Previous studies have shown a relationship between increased daily blood glucose monitoring (BGM) and reduced A1C levels for Type-1 diabetes patients. This analysis quantifies the reduced risk for complications and estimates the lifetime costs for complications by modeling the effects of BGM induced lower A1C levels over a lifetime. A standard Monte Carlo simulation combining published literature for risk of long-term diabetic complications with risk functions for each complication was used. Clinical outcomes were based upon following diabetic complications: cardiovascular, neuropathy, nephropathy, retinopathy, keto-and lacto acidosis and hypoglycemia. Lifetime costs for complications were calculated as the yearly costs treating the different complications (US Medicare perspective) over a 50-year period. Clinical outcomes and lifetime costs were discounted at 3%. Patient baseline data were taken from a representative cohort of newly diagnosed type-1 diabetes patients. The effect of testing BG on A1C was taken from published literature, which showed that the reduction in A1C values from baseline was 0.70% ($p < 0.001$) by having one daily BGM. Other studies have found similar reductions. **RESULTS:** The difference in QALY was 0.46 years (LYG was 0.37 years) and lifetime cost was lower, due to fewer complications for the group with more frequent BGM ($54,800 vs. $60,900 per patient over time). Furthermore, clinical outcomes showed that the largest difference in reduced risk for complications was for nephropathy where the risk was reduced by more than half in the group which did more BG test. Sensitivity analyses support the validity and reliability of the results. **CONCLUSIONS:** This study showed the importance of BG testing on the risk of complications for Type 1 diabetes patients. The reduced risk for complications translates into less costs and thus less burden for the patients and the society.

PDB13

PHARMACY AND MEDICAL RESOURCE UTILIZATION AMONG INITIAL METFORMIN AND THIAZOLIDINEDIONE PATIENTS

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OBJECTIVE: To compare prescription and medical resource utilization by patients in Maryland Medicaid plans who are initiated on thiazolidinediones (TZDs) versus those initiated on metformin. **METHODS:** This study includes a prospective nonconcurrent analysis of prescription and medical claims for Maryland Medicaid patients who were initiated on metformin or TZDs between June 15, 2000 and June 15, 2002. We ran univariate, bivariate, and multivariate models, examining the associations between the likelihood of being initiated on a TZD and age, gender, race, county of residence, coverage group, and days supply, as well as variables to assess resource utilization: drug count, total pharmacy claims, unique diagnoses count, and total medical claims. Logistic regression models were used to assess the combined effect of all utilization variables on the likelihood of incident use of TZDs or metformin, adjusting for demographic variables. We also tracked the use of metformin and TZDs in this population. **RESULTS:** The sample of 4440 patients was mostly female (71.19%), older (52.58% over 49 years old) and African American (58.84%). Patients with higher numbers of unique diagnoses (OR = 1.6, $p = 0.0071$), prescription claims (OR = 1.5, $p = 0.0813$), and unique drugs (OR = 1.7, $p = 0.028$) were more likely to have received TZDs first line. Those patients with higher numbers of medical claims (OR = 0.5, $p = 0.0029$) were less likely to have been started on TZDs. Among patients started on metformin, 84% did not have subsequent use of TZDs. Among those started on TZDs, 82% did not use metformin. **CONCLUSIONS:** Results show that patients initiated on TZDs are more likely to have subsequently higher utilization of prescription resources, even after adjusting for demographic variables. These patients were also likely to use less medical resources than metformin initial users.

PDB14

PROPENSITY SCORE METHODS FOR REDUCING BIAS IN THE COMPARISON OF COSTS AND UTILIZATION BETWEEN INSULIN LISPRO AND REGULAR INSULIN

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OBJECTIVE: To compare results from two approaches—propensity score binning or matching—for reduction of selection

bias when comparing costs and utilization between insulin lispro and regular human insulin users. **METHODS:** A retrospective analysis of medical and pharmacy claims was conducted among users of insulin lispro or regular insulin during the identification period, March 1, 2000 to February 28, 2001. Propensity scores (PS) were estimated using age, gender, comorbidities, use of oral antidiabetic medications, prescription copayment, and baseline period diabetes-related costs and utilization. Our binning analyses classified all patients into five PS strata (quintiles). Overall cost and utilization differences during the 12-month follow-up period were then calculated using weights inversely proportional to variances of within bin differences. In our matched analyses, all subjects who could not be "paired" (1:1 lispro to regular insulin) with PS estimates agreeing within ±0.0001 were excluded. **RESULTS:** Of 6436 subjects, 1972 (30.6%) received insulin lispro and 4464 (69.4%) received regular insulin. At baseline, lispro subjects were younger, had fewer comorbidities, and were less likely to use oral antidiabetic medications than regular insulin users. Within PS quintiles, there was no significant imbalance on baseline characteristics. When matching, only 969 well-matched subject pairs could be retained. Baseline characteristics of these well-matched subjects were similar to those of subjects in quintiles 3 and 4, indicating that matching had tended to exclude subjects with extreme combinations of characteristics (quintiles 1 and 5). **CONCLUSIONS:** Relative to matching, the binning approach to adjustment for treatment selection bias appears to provide an answer that is more easily generalized to our full diabetic population. The binning approach uses all available outcome data to estimate overall treatment differences. Our analyses suggest that restrictions on insulin lispro availability to save pharmacy costs may not be economically justifiable from a more comprehensive payer's perspective.

PDB15

TOTAL CHOLESTEROL, HDL CHOLESTEROL AND HBA_{1c} AFFECT QUALITY-ADJUSTED LIFE YEARS AND HOSPITAL COSTS FOR PATIENTS WITH TYPE 2 DIABETES IN THE UNITED KINGDOM—THE CARDIFF DIABETES COST UTILITY MODEL

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OBJECTIVES: The Cardiff Diabetes Cost Utility Model is a discrete-event stochastic simulation model used to model macrovascular and microvascular complications in diabetes. The model was based on the Eastman DCCT model, and forecasts costs and outcomes over a 20-year period using the UKPDS risk engines for estimating cardiovascular events. This study used the Cardiff model to estimate quality-adjusted life years (QALYs) and cost of secondary care for patients with type-2 diabetes. **METHODS:** Health utility was incorporated via the EQ5D utility instrument using estimates derived from the Health Outcomes Data Repository (HODaR). This diabetes model accurately incorporates health utility estimates for patients with individual and multiple complication states. The model was run using baseline risk profiles used by Eastman and was compared with a 10% change in individual and combined modifiable risk factors. We evaluated the impact of these changes on the costs of secondary care events, excluding drug costs. Costs were discounted at 6% and benefits at 1.5%. **RESULTS:** At baseline, the total discounted cost of hospital events was £5841 (£3305 for cardiovascular events and £2536 for microvascular events). Following a 10% change in one of three modifiable risk factors, hospital event costs and QALYs gained were driven by the total cholesterol to high-density lipoprotein cholesterol ratio (TC:HDL-C) (–£392; 0.23 QALYs) and glycated hemoglobin (HbA_{1c}) level (–£1236; 0.44 QALYs). TC:HDL-C had the greatest impact on cardiovascular costs (–£423), and HbA_{1c} had the greatest impact on microvascular costs (–£890). These results were dependent on the age of the population modeled: as age increased, HbA_{1c} had less impact on events and costs and TC:HDL-C had more impact. **CONCLUSIONS:** This study further demonstrates the importance of TC:HDL-C and HbA_{1c} on cost of macro- and microvascular complications, respectively. This economic model is the first to reliably evaluate benefit in terms of health utility.

PDB16

THE ECONOMIC AND HEALTH OUTCOMES OF USING DIFFERENT INSULIN DELIVERY DEVICES IN A MANAGED CARE ENVIRONMENT

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OBJECTIVES: To analyze the pharmacy and medical care costs of using different insulin-delivery methods, including pen-injectors, disposable syringes, and traditional injection; and examine the prevalence of hypoglycemic and hyperglycemic events among patients on different delivery methods. **METHODS:** Utilizing pharmacy and medical claims from a managed care plan of over two million members, this study selected continuously enrolled patients who received insulin or insulin delivery products between July 1, 2000 and June 30, 2001, but did not have claims for these products in the six months prior to the index date. The patients were divided into three analysis groups based on initial insulin delivery method: pen-injector, disposable syringe, or traditional injection. Pharmacy and medical utilization, costs, and prevalence of hypoglycemic or hyperglycemic events in the 18 months following index date were compared among the 3 groups. **RESULTS:** Among the 3278 patients who received insulin products in the 12 months from July 1, 2000 to June 30, 2001, nearly 88% took the traditional injection approach, only 12% adopted the delivery devices, including 146 patients (4.45%) who used pen injectors and 250 patients (7.63%) who used disposable syringes. Log-transformed linear regressions showed that pen-injector and disposable users cost 58.5% and 50.3%, respectively, more than patients using traditional injections in pharmacy expenditures, but not in medical services expenditures, controlling for patient demographics, comorbidities, community characteristics, and type of health plan. Controlling for the same covariates, a logistic regression indicated that the likelihood of having hypoglycemic or hyperglycemic events was similar between traditional injection and the devices ($p > 0.05$). **CONCLUSION:** This study did not find significant difference in medical costs and insulin-related health events between patients who took insulin via traditional injection and those adopted pen injectors or disposable syringes, although traditional injections were less costly.

PDB17

RETIREE TYPE 2 DIABETES HEALTH CARE COSTS FOR A SELF-INSURED TELECOMMUNICATIONS COMPANY

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